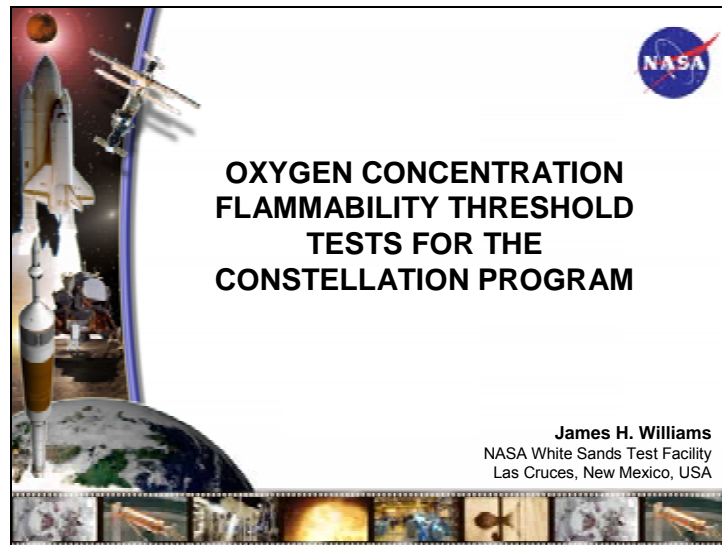
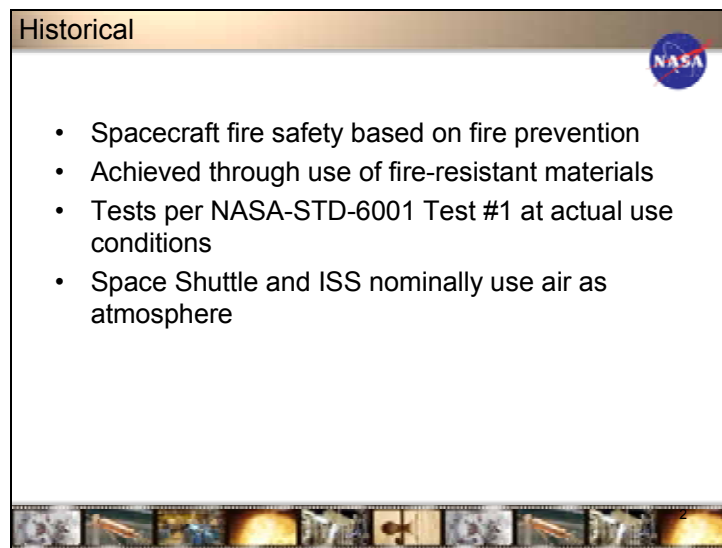


Slide 1




No notes

Slide 2

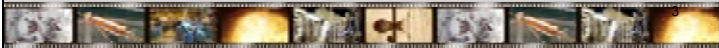


Tests use samples normally 30.5 cm long & 6.4 cm wide at actual SS or ISS use conditions; air at 14 psia. Max concentration SS 30% O<sub>2</sub> at 10.2 psia; ISS 25.9% at 14.9 psia. EVA prebreathe 30% O<sub>2</sub> and 10.2 psia.

Historical (continued)



- CEV atmosphere will likely be different
- Variable atmosphere because of changing functions
- Current testing not able to handle atmosphere changes
- NASA WSTF suggests flammability threshold testing




CEV atmosphere will likely change because craft will be used as LEO spacecraft, lunar spacecraft, orbital spacecraft. Possible O<sub>2</sub> % increase and overall pressure decrease pressure vessel certs on spacecraft. Want 34% minimum threshold. Higher, better when atmosphere changes.

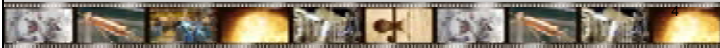
WSTF suggests testing all materials/components to find flammability threshold, pressure and atmosphere.

#### Slide 4

### Flammability Threshold




- Perform flammability tests at varying oxygen concentrations and pressures to find actual flammability threshold.
- Threshold is “pass” criteria of NASA-STD-6001
- Material must “pass” five samples at threshold
- Material fails at 1 % more oxygen concentration
- Will provide material “databank” for future uses



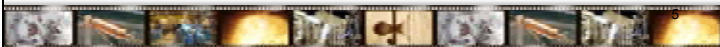
“Pass” criteria self-extinguishment is  $\leq 6$ ” burn at threshold. Pass samples are 5 in a row.

#### Slide 5

### Flammability Tests

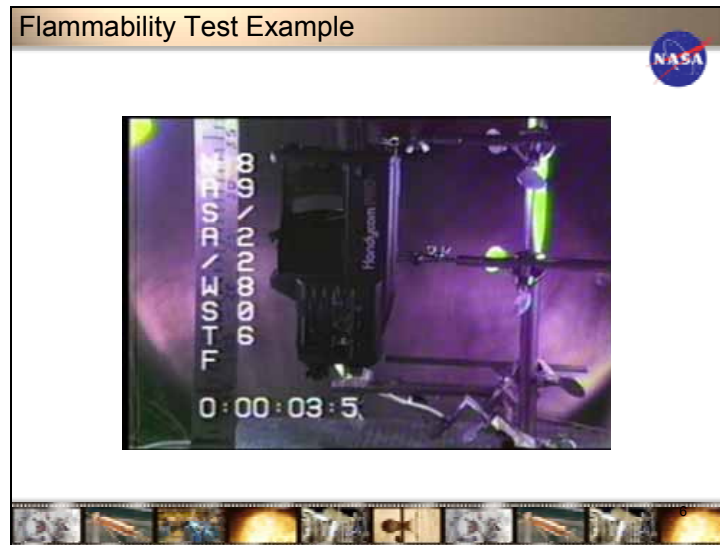


- Tests consist of ignition source on sample for ~ 30 seconds
- Upward flame propagation in quiescent environment
- Flammability samples are 15.2 – 30.4 cm long
- Ignition source heats ~15.2 cm material length
- Material passes if burns less than 15.2 cm
- Tests repeated 5 times at threshold; all must pass
- 1 % more oxygen concentration, material fails



Igniter placed  $\frac{1}{4}$ ” below sample. Burns for 20-30 seconds. 760 cals per igniter.  
1093.33 °C (2000 °F)

Slide 6



No notes

Slide 7

Preliminary Results

- Threshold tests begun on likely composites, fabrics, rigid plastics, and foams
- Results: Upward Limiting Oxygen Index (ULOI)
- Maximum Oxygen Concentration (MOC) for self-extinguishment
- Selected “likely” materials MOC vary from < 30% oxygen to >99.5 % oxygen. Tests so far only at 70.1 kPa atmospheric pressure.

NASA

ULOI not standard ASTM D 2863 LOI; ULOI is modified NASA-STD-6001

Some LEXAN and NOMEX less than 30%. Most composites greater than 40% up to 99.5+. Foams so far 33-45%. Very limited data; ongoing testing.

70.1 kPa = 10.2 psia